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Transaction Costs and Information Costs as Determinants of the Organizational Form - A Conceptual Synthesis

Transaction Costs and Information Costs as Determinants of the Organizational Form: A Conceptual Synthesis

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INTRODUCTION

The choice of an organizational form, such as the market or the firm, to conduct economic activities has been a subject of much research in management and industrial organization. An integral part of the "theory of the firm" (Coase, 1937, 1960) is the question: Why does a firm exist? It is also variously termed "vertical integration", a "make-or-buy" or "sourcing" decision. A firm may choose to secure inputs by turning to market mechanisms, usually in the form of a spot-bid contract (Williamson, 1971, 1975, 1991). A *spot-bid contract* represents a legal agreement between a buyer and seller to engage in an economic exchange within the parameters established in a written document. The transactions that exemplify the use of a spot-bid contract range from buying resin for a plastics manufacturer such as Rubbermaid to buying logs for a paper plant. A *firm* represents a combination of technologically distinct production, distribution, selling, and/or other economic processes within its confines. The existence of a firm or *vertical integration* requires that a fundamental commitment be made to produce items in-house.

Several theories have been proposed that investigate the choice of an institutional form. The traditional neoclassical theory of the firm holds that the firm is a production function of several inputs. The production costs depend on the inputs, as well as the state of technology that converts inputs into outputs. The choice to outsource a product or produce it in-house, therefore, depends on the underlying production costs. However, the traditional neoclassical theory has been criticized by several scholars because it views the firm as a "black box" that simply converts inputs into outputs (cf. Teece and Winter, 1984). It does not consider the behavioral implications of the human beings involved in production.

One of the predominant theories of institutional choice is transaction cost economics (TCE). TCE, developed by Coase (1937, 1960), Klein, Crawford and Alchian (1978), and Williamson (1975, 1979, 1985), among others, addresses the behavioral implications of the economic actors that the traditional neoclassical view of the firm overlooks. According to TCE, the choice of an organizational form depends on the costs associated with the buyer-seller transaction. These are called "transaction costs". Whether or not a product is made by a firm or bought from an outside supplier then depends on the attendant transaction costs. TCE owes much of its predictive content to the potential for "strategic behavior" of the human beings involved in a transaction.

However, the production and transaction costs may not be the *only* costs that determine the choice of market or organization. Several scholars in organization theory (e.g., Daft and Lengel, 1986; Thompson, 1967) have argued that the design of hierarchies is contingent on the "information processing requirements". For example, an uncertain environment poses substantial information processing requirements on an organization. Therefore, the organization must be designed to encourage information flow. However, the traditional literature in organization theory

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primarily focuses on how hierarchies should be designed to address the information processing requirements. This literature does not usually examine why firms arise in the first place. To answer this question, one must examine, and compare the information processing costs underlying markets and hierarchies. Several authors (e.g., Gurbaxani and Whang, 1991; Jonscher, 1983; Malone, 1985; Malone, Yates and Benjamin, 1987; Miller and Vollman, 1985) have argued that there are significant costs of acquiring, storing, processing, and disseminating information, associated with a transaction. This literature forms a part of a significant and growing body of research that acknowledges information costs as an important determinant of the choice of organizational form.

We feel, however, that the extant literature could be considerably refined and extended on several different grounds: (1) Some of the extant literature (e.g., Malone, et. al., 1987) categorizes the information costs with transaction costs. Such an approach may mask the potential tradeoff between transaction and information costs. In this paper, we treat information costs separately from transaction costs. This lets us examine how the choice of an organizational form is linked in an optimal way to the sum of information and transaction costs. (2) Although some authors (e.g., Gurbaxani and Whang, 1991) have recognized the tradeoff between transaction and information costs, there has been little effort to examine how information costs vary with the different transaction parameters (i.e., asset specificity, frequency, and uncertainty). This paper, by explicitly relating the parameters (or dimensions) of transactions to information costs, integrates the transaction cost view with the information cost approach. (3) It is also important to examine how the recent advances in information technology have affected the information cost structure underlying a transaction. This should provide us a deeper insight into how a firm's vertical integration decision is influenced by information technology. (4) In the past, frequency and uncertainty — the two parameters of transaction, have not received as much attention in the literature, as asset specificity. We explore here the relationship between information costs and these parameters of transaction. (5) Finally, there has been some contradictory evidence regarding the influence of uncertainty on the choice of organizational form. Whereas some researchers (e.g., Walker and Weber, 1984, 1987) found a positive relationship between uncertainty and vertical integration, as Williamson (1975) originally predicted, others (e.g., Harrigan, 1985) found a negative relationship. We argue that these results can be interpreted in view of the potential tradeoff beween transaction costs and information costs, that occurs in an uncertain environment.

In this paper, we compare and contrast the information costs view with the TCE view of economic organization. We also examine three transaction parameters as principal criteria underlying the choice of an institutional form: asset specificity, frequency, and uncertainty. We argue that if asset specificity were the *only* parameter driving the choice of an institutional form, the predictions using both views of economic organization would qualitatively be very similar. However, with other parameters in place, the institutional form predicted by these views may differ. We further contend that the TCE and information cost approaches be viewed as complementary.

This paper is divided into five sections. First we briefly discuss the basic tenets of TCE. Next, we lay out the theoretical arguments underlying the information costs view. We compare, contrast, and conceptually integrate the two approaches in the third section. We examine the implications of the advances in information technology for the choice of organizational form in the fourth section. Finally, we summarize our conclusions in the fifth section.

TRANSACTION COST ECONOMICS

Today transaction cost economics (TCE) has become a predominant view of the firm. TCE was developed by Coase (1937, 1960), Klein, Crawford and Alchian (1978), and Williamson (1971, 1975, 1985), among others. Unlike the traditional neoclassical view of the firm, TCE considers the behavioral implications of the economic actors. It asserts that the costs associated with the "strategic behavior" of the human beings representing the firm and the supplier (or the transacting parties) are an important determinant of the organizational form. These costs are termed "transaction costs". There are generally two types of transaction costs (Williamson, 1985, pp. 20-21): The *ex ante* transaction costs include the costs of drafting, negotiating and safeguarding an agreement. The *ex post* costs, on the other hand, include the haggling costs, set-up and running costs associated with the governance structures, bonding costs to effect secure commitments, and importantly, the maladaptation costs, should the transaction deviate from the specified terms.

The transaction costs are largely influenced by three transaction parameters: asset specificity, uncertainty, and the frequency of transaction. *Asset specificity* refers to the degree to which "an asset cannot be redeployed to alternative uses and by alternative users without sacrifice of productive value" (Williamson, 1991, p. 281). In effect, asset specificity refers to the (lack of) ease with which the human capital (employees), physical assets, and facilities specifically tied to the manufacture of an item can be used by alternative users or put to alternative uses. If a firm possesses unique assets, and it decides to

outsource an item, the firm and its supplier would be locked into a situation similar to a bilateral monopoly. Given the bounded rationality and opportunistic behavior of the transacting parties, one would expect intense haggling, and a number of contractual problems (Williamson, 1985). This would consequently raise the transaction costs. Thus, a firm with specific assets is more likely to organize the activities within its own boundaries, rather than enter into a transaction with a supplier.

According to Williamson (1985), the frequency of transaction also affects a firm's decision to outsource an item. Recurring transactions are subject to frequent haggling with suppliers, which increases the costs of writing, monitoring and enforcing a contract. Further the costs of setting up and running "specialized governance mechanisms" in a firm are easier to recover for large transactions of a recurring kind (Williamson, 1985, p. 60). Therefore, increased frequency of transaction is often associated with internalization of economic activities.

Another significant transaction parameter is the uncertainty — specifically, the behavioral uncertainty in transaction. The behavioral uncertainty is attributable to the tendency of the transacting parties to behave opportunistically. It arises out of the tendency of transacting parties to deliberately withhold or manipulate important information. Behavioral uncertainty underscores the need of the transacting parties to safeguard the contract to protect themselves. This, in turn, is expected to raise the costs of writing, monitoring, and enforcing a contract. A high level of behavioral uncertainty, therefore, influences a firm to internalize the economic activities.

INFORMATION COSTS

The importance of information in the coordination of economic institutions was recognized by Hayek (1937), Richardson (1960) and Marschak (1974). Although each of these authors has a different emphasis, they all perceive economic institutions as mechanisms for allocating decision-making responsibilities and for structuring information flow. However, only recently is it suggested that firms and markets may be alternative institutional means to structure information flow (e.g., see Casson, 1997). We feel that this is a remarkable acknowledgment of the central role of information in today's economy. However, the "information costs" approach to economic organization needs a clearer exposition. To be able to accomplish this, we need to review the traditional definition of the firm found in the institutional economics literature. A firm has been described as a nexus of transactions (Alchian and Demsetz, 1972; Demsetz, 1988, p. 156). It has also been defined as an open social system that must process information (Mackenzie, 1984), but has limited capacity. Combining the two definitions, we may describe a transaction as an open social subsystem that involves information processing.

Information usually means processed data or facts (Daft and Macintosh, 1981). It is the lifeblood of organizations, because it feeds decision-making (Daft and Weick, 1984). The information is used in a variety of ways in markets and firms. For example, in *firms*, information is the basis of strategic planning, as well as operational and tactical control (Anthony, 1965; Daft and Weick, 1984; Gorry and Scott Morton,197). In strategic planning, information is used to analyze the environment, and predict the future of the organization. The tactical control is associated with "the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of objectives", while the operational control means "the process of assuring that specific tasks is carried out effectively and efficiently" (Anthony, 1965). Similarly, in *markets*, information is used to plan or predict the environment — for example, the demand, state of technology, prices, etc. as well as monitor the product prices, output, and exercise market control.

Clearly, there are costs underlying the acquisition, storing, processing, and dissemination of information associated with the coordination of the work of people and machines that perform the primary processes. We have labeled them "information costs". These costs are somewhat similar to the "co-ordination costs", proposed by Malone, et al. (1987). However, we do *not* include the transaction costs of information processing as a part of the information costs. This enables us, as we describe later, to focus on the tradeoff between transaction costs and information costs.

The information costs include the determination of the design, price, quantity, delivery schedule, and other similar factors for products transferred between adjacent steps on a value-added chain. In markets, this involves selecting suppliers, acquiring, storing, processing and disseminating information about contracts, paying bills, and so forth. In firms, this involves managerial decision-making, accounting, planning, and control processes.

Following Williamson's (1985) rationale regarding transaction costs, we argue that one need not measure information costs in markets and hierarchies in *absolute* terms in order to predict the choice of an organizational form. It should suffice, as long as one is able to *compare* the information costs of markets and hierarchies in a qualitative fashion.

In the following section, we relate the information costs to the three parameters of transaction — asset specificity, frequency and uncertainty. The comparison of information costs underlying markets and hierarchies then also involves studying the effect of the three transaction parameters. To accomplish this, we follow the comparative statics approach, adopted

by Williamson (1985). The comparative statics approach models the before-and-after effects of parametric changes without attending to the dynamics of the actual transition path from one solution (e.g., the organizational form) to another (Hirshleifer and Riley, 1992).

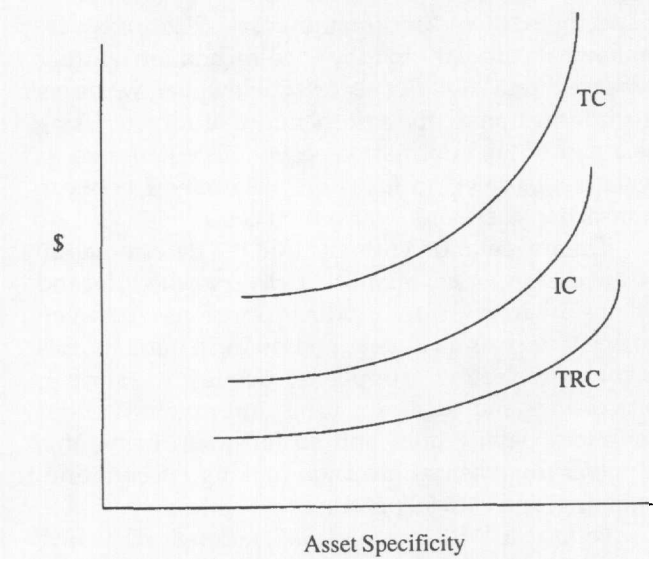
INTEGRATION OF INFORMATION COSTS AND TRANSACTION COSTS

We feel that the information costs framework for analyzing the choice of organizational form takes on greater usefulness when it is integrated with the extant views of the firm. Accordingly, we synthesize the transaction cost and information cost approaches in this section.

As mentioned earlier, transaction costs principally depend on three parameters: asset specificity, frequency, and uncertainty. It is, therefore, instructive to examine how the information costs vary with these transaction parameters, to be able to integrate the transaction costs and information costs.

Asset Specificity. To examine the relationship between asset specificity, transaction costs and information costs, consider Figure 1.

FIGURE 1
Asset Specificity, Information Costs and Transaction Costs



It is well known that in the presence of specific assets, there are significant transaction costs if the transaction is carried out through the market. This is presumably because both, the buyer and supplier are locked into a bilateral monopoly-like relationship, if the transaction is organized through the market in the presence of specific assets. The transaction costs of markets will then rise with asset specificity. The transaction costs of markets are represented by the curve "TRC" in Figure 1.

Asset specificity, by definition, means lack of ease with which assets may be used by alternative users or for alternative uses. It is, therefore, conceivable that anyone outside the firm (e.g., market) will not have as much information, as the firm, about different aspects of production such as product design, technology, processes, workforce organization necessary for production, product price, quality, etc. It becomes very expensive for a supplier to acquire, store and process this information. Further, where the asset specificity is rooted in tacit knowledge (Polanyi, 1962), it is especially difficult, and expensive, to transfer or disseminate the information to an outsider. It is, therefore, likely that high levels of asset specificity are associated with high levels of information costs if the transaction is organized through the market.

On the other hand, at low levels of asset specificity, the market has at least as much information about the production technology, processes, and prices, as the firm itself. Markets are also considered generally more efficient than hierarchies in processing information where the asset specificity is low (Jensen and Meckling, 1992). The markets do not require an expensive infrastructure to administer because all information is combined, and made available in a set of market prices. Information processing then becomes relatively more efficient. This is presumably the case in contestable markets where asset specificity is insignificant (Baumol, Panzer and Willig, 1982), and the contracts are nearly fully described by a world of competition and market prices.

The upshot of our arguments is that the information costs underlying markets vary positively with asset specificity. These are represented by the curve "IC" in Figure 1. The sum of transaction and information costs is represented by the total costs curve "TC". As evident from this figure, both — transaction costs, and information costs in the market increase with asset specificity. The TCE and the information costs approach are thus consistent. However, we would argue that the choice of an organizational form depends on the comparison of the *total costs* underlying the markets and firms. From Figure 1, it is clear that the total costs of market transaction increase with asset specificity. That is, it is increasingly inefficient to carry out a transaction through the market, as opposed to a hierarchy, as the asset specificity increases.

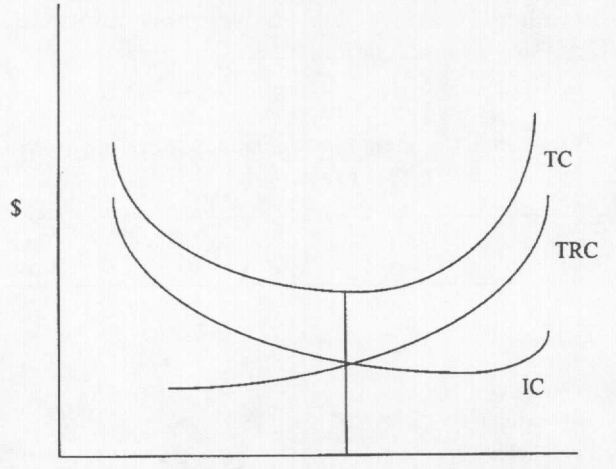
Frequency. The TCE literature asserts that the frequency of transaction is positively associated with market transaction costs. Market transactions of a recurring kind imply a high level of negotiating, monitoring and enforcement costs. Further, as Williamson (1985, p. 60) notes, recurring transactions are cheaper to organize within the boundaries of the firm. This is because the cost of the special set-up to resolve disputes in a firm is better recovered with increasing frequency of transaction that involve a

large volume of products.

Let us now examine the relationship between transaction frequency and information costs. It is well known in inventory management that there are costs of ordering an item, as well as holding it in stock. These costs may also be considered to reflect the cost of acquiring, storing, processing and disseminating information. For example, information costs of ordering may include transmitting a purchase order, processing changes in the purchase order, request for and response to quotation, product invoice, pricing and promotion information, payment information, etc. The information costs of holding an item may include storing, processing, and transmitting information about inventory levels, material storage, stockouts, etc.

There is often a tradeoff between the information costs of ordering and holding an item with respect to transaction frequency. It is possible that holding information costs decrease as the frequency of market transaction increases, assuming constant demand. On the other hand, the ordering information costs increase as the frequency of market transaction increases. The information costs will then be a sum of holding and ordering costs. Figure 2 illustrates this point clearly.

FIGURE 2
Frequency, Information Costs, and Transaction Costs



The curve IC in Figure 2 represents the information cost curve of market transaction. This is a U-shaped curve, that bears out the tradeoff between information costs of holding and ordering an item. The curve TRC represents transaction costs. As argued earlier, transaction costs increase with the frequency of market transaction. The sum of information and transaction costs is given by the total costs (TC) curve.

It is clear from the figure that there may be a tradeoff between information and transaction costs with respect to the transaction frequency. Further, the tradeoff is particularly prominent at the lower transaction frequency levels. Interestingly enough, Williamson (1985) assumes an "intermediate to moderately high" level of transaction frequency to examine the impact of other transaction parameters (especially, asset specificity). It is possible that at moderately high levels of transaction frequency, there may not be a tradeoff between transaction costs and information costs (as evident from Figure 2). Both, transaction costs and information costs rise with increasing frequency levels in this range. However, we argue that the whole range of frequency levels needs to be considered to examine their impact on the transaction costs and information costs.

We would also argue that the total costs underlying a transaction (TC) — a sum of transaction costs and information costs, may povide a richer picture of the relationship between transaction frequency, and the choice of an organizational form. Considering Figure 2, the total costs of market transaction decrease with increasing frequency levels up to a particular point (F). This is perhaps because of the lower holding information cost component of total costs lower frequencies. Therefore, it is increasingly more efficient to carry out a transaction through the market upto the point F.

As the transaction frequency rises further, the market form becomes increasingly inefficient. This is possibly because of the higher ordering information cost, as well as the transaction cost component. Therefore, a hierarchy may be increasingly preferred at higher frequency levels.

Uncertainty. Uncertainty is usually considered the third parameter of transaction. The type of uncertainty critical to transaction cost economics is the behavioral uncertainty (Williamson, 1985). Behavioral uncertainty arises out of the ability of transacting parties to surprise each other. It may arise out of a lack of information, strategic non-disclosure, disguise or distortion of information (note that information distortion involves not a lack of information but the conscious supply of false and misleading signals). High levels of behavioral uncertainty, therefore, imply that the transacting parties need to acquire more information where there is a lack of it or sort out accurate information from false and inaccurate information. This clearly raises the information costs on the part of the transacting parties. Therefore, high levels of behavioral uncertainty may be associated with the firm as an organizational form.

Williamson (1985), moreover, asserts that behavioral uncertainties alone would not pose contractual problems if transactions were known to be free from "exogenous disturbances". There would be no occasion to adapt, and unilateral efforts to alter contracts would be voided by the courts or other third

party appeal. Unfortunately, the notion of exogenous uncertainty is not well developed in the TCE literature. Uncertainty, according to Knight (1965), refers to situations where an individual is unable to calculate the probabilitites on the basis of an objective classification of outcomes. Mahoney (1992) has cited two dimensions of uncertainty as having a significant influence on transactions — demand and technological uncertainty. We believe that these dimensions may largely represent the "exogenous uncertainty". Demand uncertainty means the ability or inablity of a firm to predict the sales volume, whereas technological uncertainty denotes a firm's ability or inability to forecast changes in production methods, rates of innovation, or product changes (Miller, 1985).

There has been some controversy in the TCE literature about the effect of demand and technological uncertainty on the choice of an organizational form. For example, Williamson (1985), in the vein of Frank Knight's arguments, asserts that increased levels of uncertainty imply inability of transacting parties to predict all outcomes. In that case, there will be significant contractual problems, because a writing and enforcing a complete contingent claims contract is impossible. Therefore, there will be *greater* vertical integration. This assertion received some empirical support (e.g., Walker and Weber, 1984, 1987). On the other hand, some researchers (e.g., Harrigan,1985, 1986) empirically demonstrated that demand and technological uncertainty were associated with *less* vertical integration. Their arguments rest on the notion that technological and demand uncertainty is likely to discourage vertical integration due to the strategic inflexibility that may accompany vertical integration. For example, under technological uncertainty, vertical integration may constrain the ability of a firm to alter strategy due to a firm's commitment to a now-obsolete technology.

We argue that both — technological and demand uncertainty may increase the information costs if a transaction is organized within the boundaries of a firm. For example, rapid changes in a firm's core technology imply that the information has to be processed continually, and rapidly. This can pose significant problems in hierarchies, especially when the technology is non-routine, and the organizational tasks are interdependent (cf. Thompson, 1967). The co-ordination problems in information processing across the horizontal and vertical levels in a hierarchy contribute to an increase in the information costs. Markets, on the other hand, process information more efficiently in such a situation, for the reasons mentioned earlier.

A firm, that encounters fluctuating demand, also faces a similar dilemma. It needs to monitor and process the information about demand and prices continually. This increases the information costs associated with planning. Similarly, there are high information costs associated with implementing a decision in an environment characterized by high demand uncertainty. For example, the information requirements accompanying fluctuating demand pose great constraints on a firm's organization structure and controls. As a result, market transactions may be favored over hierarchies, ceteris paribus, when there is high demand uncertainty in the environment.

Our arguments above suggest that there may be a tradeoff between transaction costs and information costs with respect to technological and demand uncertainty. Whereas transaction costs increase with the level of uncertainty, the information costs underlying markets may, actually decrease. The sum of transaction costs and information costs constitutes total costs. Invoking a rationale, similar to that in the case of transaction frequency, we argue that the market form of transaction becomes increasingly efficient with increasing uncertainty (technological and demand) levels up to a particular point. Beyond this point, though, the market form of transaction becomes increasingly inefficient with increasing uncertainty levels.

All our preceding arguments are summarized in Table 1. Table 1 depicts the relationship between the transaction parameters on the one hand, and the transaction costs, information costs, and total costs, on the other. Next, we will analyze how information technology these relationships.

TABLE 1
Transaction Costs and Information Costs: An Integrative Framework

Transaction Parameters	Transaction Costs	Information Costs	Total Costs
Asset Specificity	+	+	+
Frequency	+	-/+	-/+
Uncertainty			
Behavioral	+	+	+
Technological	+	-	-/+
Demand	+	-	-/+

Note: (1) Indicated above are the costs underlying a market transaction
(2) The positive, negative, and curvilinear relationships are indicated by +, -, and -/+ respectively

INFORMATION TECHNOLOGY AND THE CHOICE OF ORGANIZATIONAL FORM

There have been significant advances in information technology in the past few years. Information technology (IT) has been defined as the "technology that allows companies to capture, store, manipulate, and distribute information" (Clemons

and Row, 1992). These technologies include decision support systems, transaction processing systems, and interorganizational communication systems.

Information technology has evolved over the past few years to such an extent that firms rely heavily on their ability to access reliable, up-to-date information when making routine and non-routine decisions (Gorry and Morton, 1971). Following Malone, et al. (1987), we argue that information technology may allow more information to be communicated in the same amount of time (or the same amount in less time), and reduce the costs of this communication significantly. As an example, consider the recent significant advances in the interorganizational systems, such as the electronic data interchange (EDI).

EDI is a specific type of interorganizational system that ties businesses with suppliers. Barrett and Konsynski (1982) have described interorganizational systems as including the hardware, software, transmission facilities, rules and procedures, data/databases, and expertise that are shared between two or more organizations. EDI can be defined as the "interorganizational exchange of business documentation in structured, machine-processable form" (Emmelhainz, 1990, p. 4). EDI provides an option for companies to replace traditional modes of exchanging business documents such as purchase orders, invoices, shipping notices, order confirmations, and payment receipts. These common business documents can now be transmitted electronically over networks, rather than using mail, facsimile, couriers or other conventional modes.

The direct computer-to-computer exchange of data is an appealing prospect since it is estimated that 70 per cent of all business data is re-keyed from one computer system to another (I/S Analyzer, 1989). EDI use can expedite interorganizational transactions, reduce transmission costs, improve the accuracy of the information exchanged, and reduce paper flow.

The upshot of the above arguments is that the costs of acquiring, storing, processing, and disseminating information are significantly reduced because of information technology. Consider Figure 1 again. The total costs underlying markets and firms are given by the sum of corresponding information and transaction costs. Our arguments in this section imply that there is a reduction in the information costs, and consequently, the total costs of market transaction, as a result of information technology. Therefore, there is a downward shift in the total cost curve representing market transactions. That is, information technology facilitates outsourcing to a greater degree at a given level of asset specificity. Alternatively, information technology helps a firm maintain the same level of outsourcing as before even if the asset specificity increases.

To examine how information technology influences the relationship between information costs and frequency, consider Figure 2 again. We have argued that the fixed costs per transaction of installing and maintaining an interorganizational information system, such as the EDI, decrease with the increasing frequency of transaction. In other words, increased frequency of transaction helps recover the fixed information costs better. Similarly, the variable information costs per transaction have also decreased dramatically. For example, today it costs less than before to send the same amount of information because of the advances in interorganizational systems, such as the Internet. The end result is a reduction in the total information costs of market transactions, as a result of information technology. The total cost curve in Figure 2 then moves downward. Therefore, information technology facilitates a higher degree of outsourcing at a given frequency level. Equivalently, one may argue that information technology helps retain the same degree of outsourcing as before even at increased frequency levels.

We would also argue that uncertainty in a firm's core technology and information technology may increase the information costs in a firm. This may be attributed to the need on the part of the transacting parties to continually monitor the changes in technology. The transacting parties are also required to frequently upgrade the technology. As an example, the use of EDI technology entails extensive software capabilities such as server platforms, mapping and implementation setup tools, and support for ANSI X12 and EDIFACT standards (Andersen and Mason, 1992). However, there are a number of changes taking place in the server technology with new PC and RISC platforms being introduced. There is a debate about whether the high end, secure RISC platforms are more cost effective than the cheaper PC platforms. The future of EDI technolgy iteself seems insecure with the arrival of the Internet. According to many companies, EDI is more expensive than Internet-based electronic commerce. With so much technological uncertainty looming on the horizon, it becomes very expensive for firms to keep track of new technological trends. Therefore, there is reluctance on the part of a large number of companies to commit to a specific technology when the environment is uncertain.

Finally, we would argue that information technology enables transacting parties to better deal with environmental uncertainty, especially the fluctuations in demand. For example, EDI and other forms of interorganizational systems help transacting parties track changes in demand more effectively. EDI also make it possible to implement continuous replenishment and quick response systems (Bamfield, 1994; Lambert, Emmelhainz and Gardner, 1996). Information technology also contributes to greater flexibility in production. The upshot of our arguments

is that information technology has made it possible to undertake market transactions at demand uncertainty levels greater than before.

SUMMARY

Many researchers have invoked the transaction cost economics rationale to explain the choice of an organizational form. On the other hand, some authors (see Stinchcombe, 1990 for a review of the literature) have asserted that an organization is an information processing social system. This view promises to, and has in fact, already started to gain prominence in research and practice in the Information Age. Consistent with this approach, we argue that one needs to consider costs of acquiring, storing, processing, and disseminating information in addition to transaction costs to be able to predict the organizational form.

We contend that both information costs and transaction costs are dependent on three transaction parameters: asset specificity, frequency, and uncertainty. Whereas both types of costs are qualitatively similar in their influence on a transaction with respect to asset specificity, this may not be the case with the other two transaction parameters. Indeed, it is possible that there may be a tradeoff between information costs and transaction costs with respect to frequency and uncertainty. Our paper highlights this tradeoff. In other words, if asset specificity were the only transaction parameter that influenced a transaction the information cost and transaction cost approaches would be qualitatively similiar. However, with other paramaters in place, their influences on a transaction may be qualitatively different. Therefore, the choice of an organizational form may be seen as a decision to economize on the sum of both, information costs, and transaction costs. We also argue that recent advances in informational technology have generally lowered the information costs underlying the market form of transaction.

We have attempted here to fill some of the voids in the extant literature on this important subject: (1) We treat the information costs separately from transaction costs. This allows us to focus on the potential tradeoff between transaction and information costs. (2) We also conceptually synthesize the transaction and information cost approaches by relating the information costs to the three parameters of transaction.

(3) We examine the impact of recent advances in information technology on information costs. (4) Finally, this paper addresses frequency and uncertainty, two of the relatively underinvestigated transaction parameters.

It has already been proposed that information technology generally reduces the *transaction costs* through better coordination, and monitoring capability (e.g., see Clemons, Reddi and Row, 1993). Our paper complements this approach by examining the influence of information technology on *information costs*. We feel that future research may investigate the combined effect of information technology on both, transaction costs, and information costs.

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